Ingestion of Caustic Substances (Caustic Injury of the Oesophagus)

Definition / Supporting Information

See Risk of death and serious harm from delays in recognising and treating ingestion of button batteries [NHS England patient safety alert].

Caustic injury of the oesophagus is a major, but preventable, paediatric health concern.

Many household agents can cause caustic exposures.

No single symptom, sign or combination of either has been found to predict accurately the degree of oesophageal injury after corrosive ingestion.

Essential History

Evaluation should progress only after the ABCs (airway, breathing, and circulation) of resuscitation have been addressed.

Ask about:

- The agent ingested (see Table 1)
  - Knowing the formulation and pH of the substance will provide some indication of the likely degree of damage that may occur.
    - Acids cause superficial eschar formation, which may limit penetration into deeper tissues (a notable exception to this is hydrofluoric acid which can easily penetrate and destroy deep tissue layers).
    - Strong alkalis cause liquefaction necrosis, which allows penetration of the corrosive agent transmurally through the oesophagus into adjacent mediastinal tissues.
  - Knowing the name of the chemical enables it to be referenced on data sheets and with the National Poisons Information Database (Toxbase).

Table 1: Acids and Alkalis

Acids	Alkalis
Hydrochloric acid • Swimming pool cleaners • Toilet bowl cleaners • Metal cleaners Hydrofluoric acid	Ammonia • Toilet bowl cleaners • Hair dyes • Floor strippers • Glass cleaners

• Rust remover Sulfuric acid • Car batteries • Drain cleaners	Sodium hydroxide • Detergents • Laundry powders • Paint removers • Drain cleaners • Button batteries • Oven cleaners Sodium borates, carbonates, and phosphates • Detergents • Water softeners Sodium hypochlorite • Bleaches • Household cleaners

- The time of ingestion (indicating duration of contact)
- The likely amount of substance ingested
- Where the agent was stored and how the child got hold of it
  - Are there child safety / supervision concerns?
- Suicidal intent

'Red Flag' Symptoms and Signs

Ask about:

- Searing or burning pain of mouth and lips
  - Absence of pain does not exclude significant injury.
- Drooling or hypersalivation
- Difficulty with swallowing (see Dysphagia)
- Stridor, dysphonia, or aphonia caused by epiglottic or vocal cord oedema
- Substernal or back pain
  - Usually resulting from oesophageal disruption and mediastinitis
- Acute epigastric pain / retching
  - May indicate gastric perforation

Look for:

- Fever
  - Strongly correlated with significant injury
- Oral burns
  - Absence of oral burns does not exclude an oesophageal burn injury.

- Oropharyngeal damage
  - Does not reliably indicate oesophageal involvement
- Bleeding
  - Can result from mucosal sloughing, with persistent ooze from the exposed submucosa or muscularis
  - Life-threatening haematemesis from development of an aorto–oesophageal fistula is rare.

Investigations

Evaluation should progress only after the ABCs (airway, breathing, and circulation) of resuscitation have been addressed.

To be undertaken by specialist practitioners (eg, Emergency Department / Paediatric / Paediatric Surgery / Paediatric Gastroenterology Team(s)):

- Chest X-ray
  - May identify concomitant aspiration, subcutaneous cervical emphysema, pneumomediastinum, or perforation
- CT scan of chest
  - For early, non-invasive assessment of oesophageal, gastric, and lung injury

Diagnostic procedures

- Endoscopy
  - Usually undertaken in symptomatic patients or where there is a high risk of oesophageal injury within the first 12–24 hours, at the discretion of Paediatric Surgery and / or Paediatric Gastroenterology Team(s).
  - Contraindications to endoscopy include clinical or radiological suspicion of perforation or presence of laryngeal / epiglottic burns which may lead to airway obstruction.

Treatment Approach

To be undertaken by non-specialist practitioners (eg, General Practitioner (GP) Team):

- Identify and address any problems with ABC (airway, breathing, and circulation) and arrange urgent transfer for any child with suspected caustic ingestion to the nearest emergency department with paediatric facilities.

To be undertaken by specialist practitioners (eg, Emergency Department / Paediatric / Paediatric Intensive Care / Paediatric Surgery / Paediatric Gastroenterology / Paediatric Ear, Nose and Throat Team(s)):

- Emergency management
  - Close attention to ABC

        - Stridor or aphonia indicates laryngoepiglottic injury and may require urgent endotracheal intubation for airway protection.
        - Occasionally, severe laryngeal destruction necessitates emergency cricothyroidotomy or tracheostomy.
    - Adequate vascular access to allow for correction of hypovolaemia or hypotension
        - Fluid resuscitation if needed
    - Nasogastric tube placement is not recommended routinely because it may be associated with subsequent stricture formation.
    - Pain management
- Antimicrobial therapy
    - Controlled trials do not support antibiotic use.
    - Vigilance for mediastinitis or systemic infection must be maintained
    - Reserve appropriate antimicrobials for any evidence of local or systemic infection
- Nutrition
    - Parenteral nutrition for patients with mucosal haemorrhage and / or ulceration
    - Oral feeds are withheld until dysphagia of initial phase has regressed and no evidence exists of clinical or radiographic deterioration
- Proton pump inhibitors
    - Acid reflux can exacerbate underlying injury and accelerate stricture formation
- Corticosteroids (to limit fibrosis after caustic injury) are not indicated routinely
- Gastric lavage and emetics should be avoided
    - Risk of re-exposing the oesophagus to ingested corrosive agent
    - Threat of aspiration
    - Possibility of propagation of injury beyond the level of the pylorus
- Any attempt to neutralise an ingested caustic agent poses additional danger, because the resultant exothermic reaction frequently exacerbates the primary burn injury
- Activated charcoal is not recommended, is ineffective, and obscures endoscopic visualisation

Specific treatment

- Surgical management
    - Required for:
        - Severe corrosive injuries
        - Intractable oesophageal strictures
    - Early surgical intervention may be life saving
    - Delay in diagnosis of oesophageal perforation can be fatal

  - Immediate surgery is required for:
    - Peritonitis
    - Pneumoperitoneum
    - Clinical deterioration, evidenced by refractory acidosis, neurological decline, or coagulopathy
- Removal of button (disk) batteries (if in the oesophagus or symptomatic)
  - See Risk of death and serious harm from delays in recognising and treating ingestion of button batteries [NHS England patient safety alert]

When to Refer

Refer (arrange emergency transport) all patients with oesophageal caustic injury to specialist practitioners (eg, Emergency Department / Paediatric Intensive Care / Paediatric Surgery / Paediatric Gastroenterology Team(s))

Escalate care to Paediatric Intensive Care Team if:

- Stridor or aphonia
  - Indicates laryngoepiglottic injury and may require urgent endotracheal intubation for airway protection

'Safety Netting' Advice

- Refer families to the health visitor for consideration of a home inspection and further provision of safety advice (see When to suspect child maltreatment [NICE clinical guideline CG89]).
- Warn parents of the long-term complications of corrosive ingestions, including:
  - Stricture formation leading to potential swallowing and eating problems
  - Gastric outlet obstruction
    - Characterised by early satiety (see Appetite Loss) and weight loss
    - Can occur years after initial injury

Patient / Carer Information

Please note: whilst these resources have been developed to a high standard they may not be specific to children.

- What to do if your child has an accident (Web page), the NHS website
- Poisoning (Web page), the NHS website

Resources

National Clinical Guidance

When to suspect child maltreatment (Web page), NICE clinical guideline CG89, National Institute for Health and Care Excellence.

Medical Decision Support

Neglect (Web page), RCPCH Child Protection Companion

Suggested Resources

Please note: these resources include links to external websites. These resources may not have national accreditation and therefore PCO UK cannot guarantee the accuracy of the content.

Toxbase (Website), National Poisons Information Service.

Keeping children safe from poisoning (Web page), Child Accident Prevention Trust.

Patient safety alert – Risk of death and serious harm from delays in recognising and treating ingestion of button batteries, NHS England, 2014.

Sodium hydroxide: General information, Health Protection Agency, 2010.

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